

Figure 1.

Set-associative caching device organized as
M number of sets with N elements in each set.

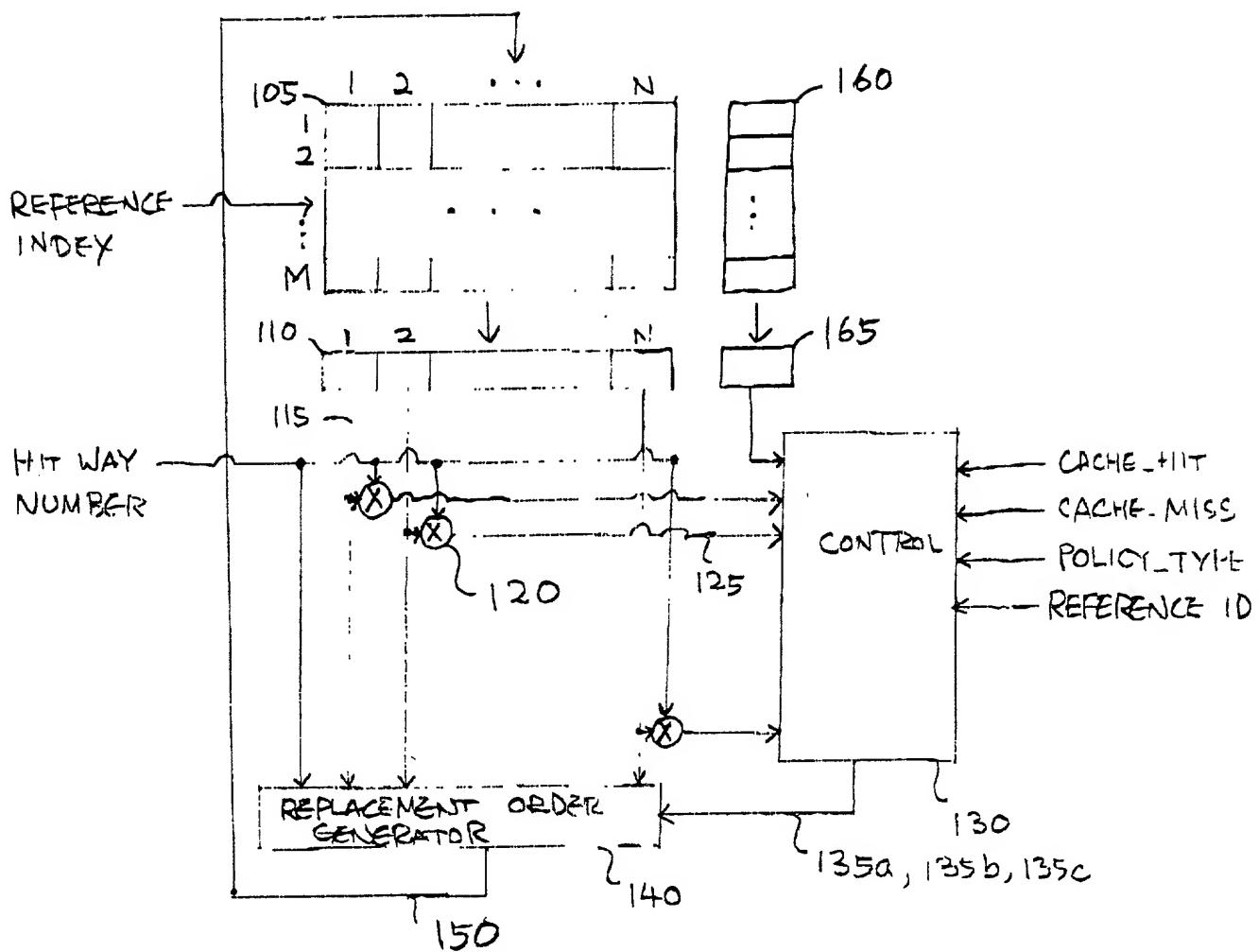


Figure 2

2 100

Programmable replacement mechanism

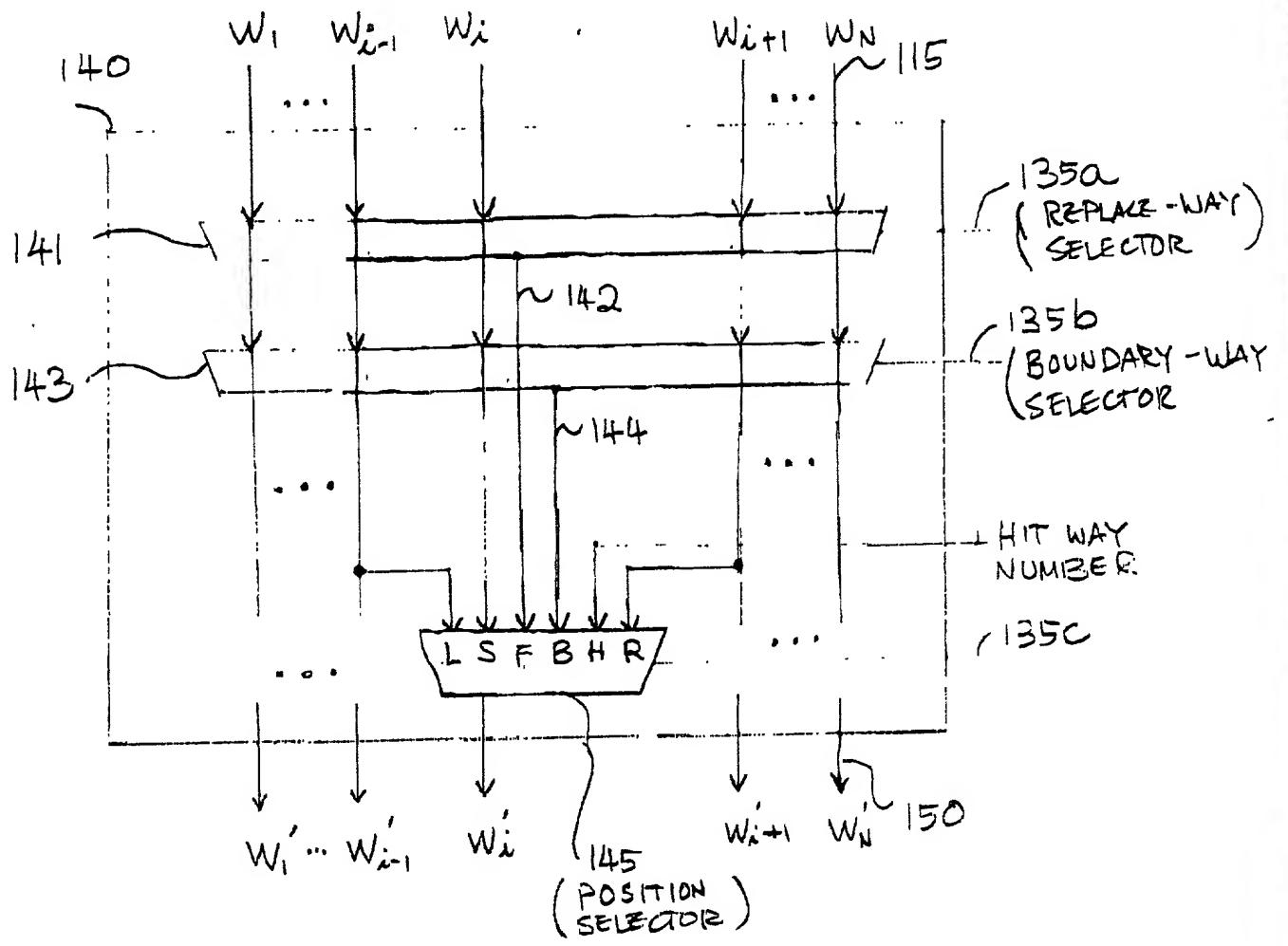


Figure 3
Replacement order generator

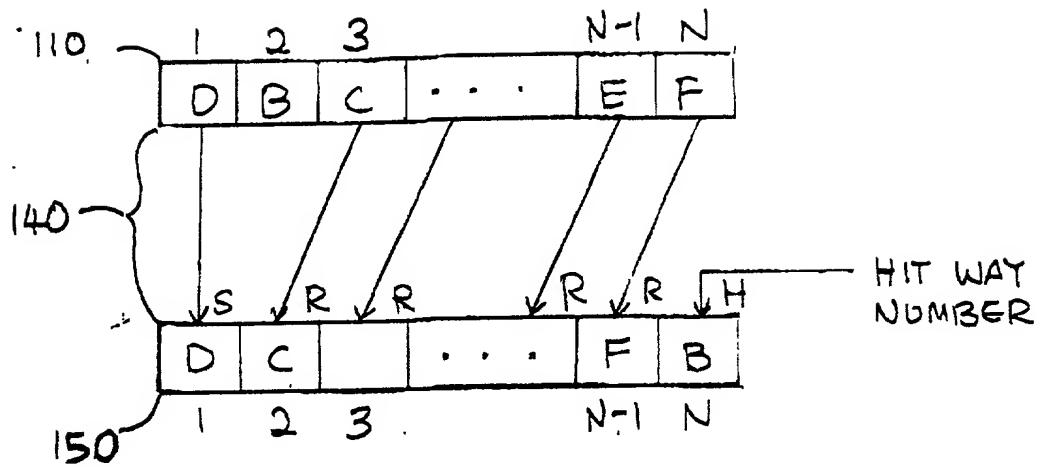


Figure 4

Replacement order generator producing new replacement order when a reference is a hit on element residing in way B.

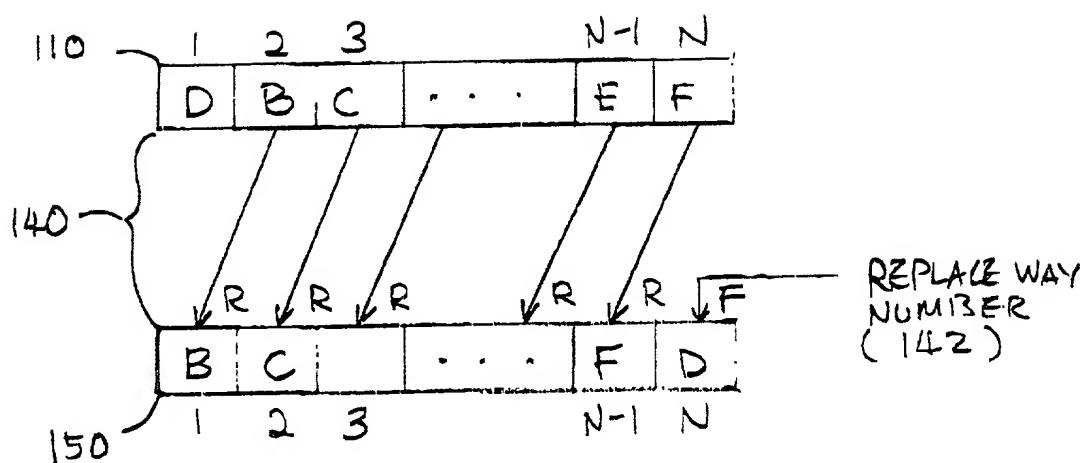


Figure 5

Replacement order generator producing new replacement order when a reference is a miss.

Access Result	mux 1	mux 2	mux 3	mux 4	mux 5	mux 6	mux 7	mux 8
miss	R	R	R	R	R	R	R	F
hit 1	R	R	R	R	R	R	R	H
hit 2	S	R	R	R	R	R	R	H
hit 3	S	S	R	R	R	R	R	H
hit 4	S	S	S	R	R	R	R	H
hit 5	S	S	S	S	R	R	R	H
hit 6	S	S	S	S	S	R	R	H
hit 7	S	S	S	S	S	S	R	H
hit 8	S	S	S	S	S	S	S	H/S

Table 1

FIGURE 5A

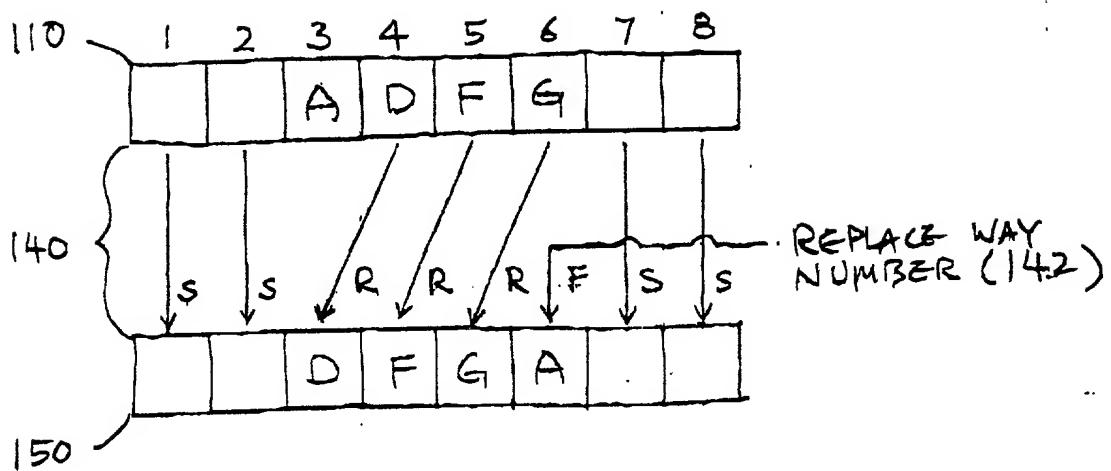


Figure 6

When a reference is a miss and the reference partition consists of positions 3-6.

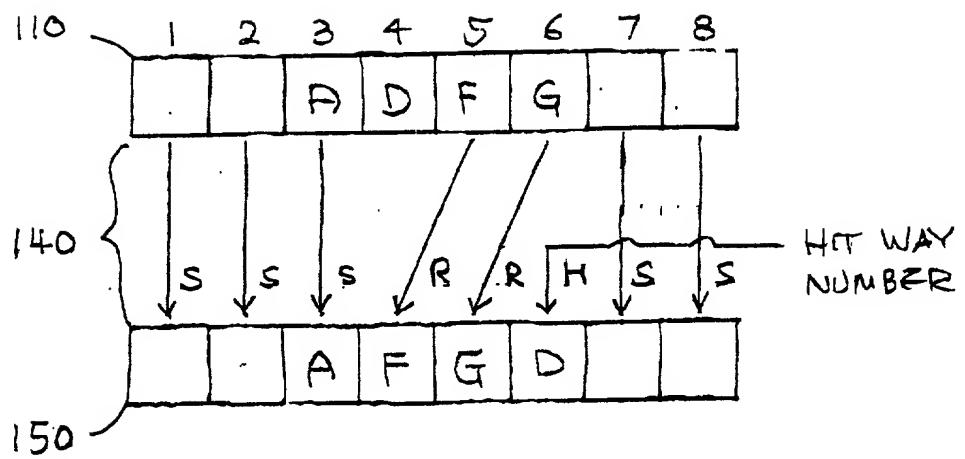


Figure 7

When a reference hits on way D, that resides in a position within the reference partition consisting of positions 3-6.

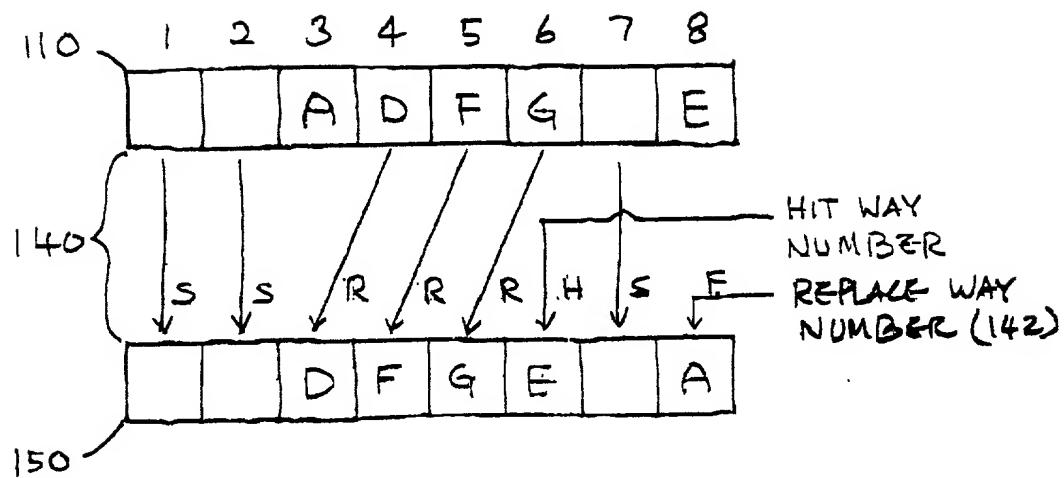


Figure 8

When a reference hits on way E that resides in a position outside the reference partition consisting of positions 3-6.

ID	Access Result	mux 1	mux 2	mux 3	mux 4	mux 5	mux 6	mux 7	mux 8	Fsel
Y	miss	S	S	R	R	R	F	S	S	3
Y	hit 1	F	S	R	R	R	H	S	S	3
Y	hit 2	S	F	R	R	R	H	S	S	3
Y	hit 3	S	S	R	R	R	H	S	S	3
Y	hit 4	S	S	S	R	R	H	S	S	3
Y	hit 5	S	S	S	S	R	H	S	S	3
Y	hit 6	S	S	S	S	S	H/S	S	S	3
Y	hit 7	S	S	R	R	R	H	F	S	3
Y	hit 8	S	S	R	R	R	H	S	F	3

Table 2

FIGURE 8 A

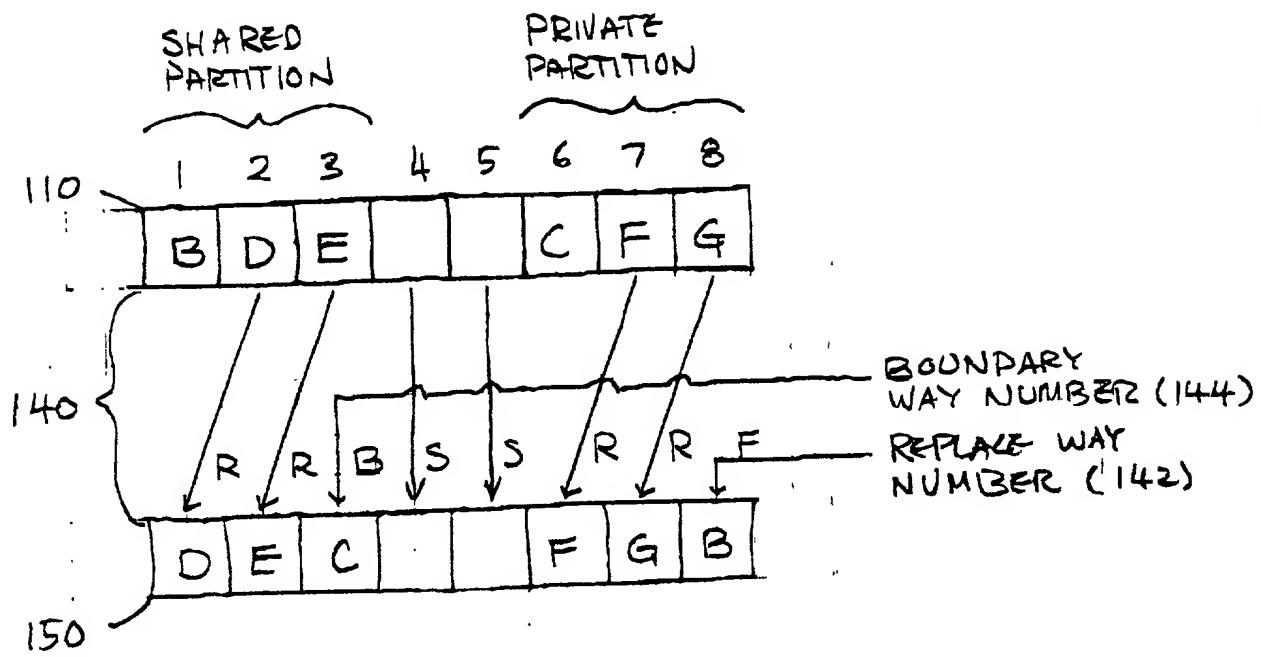


Figure 9. MISS

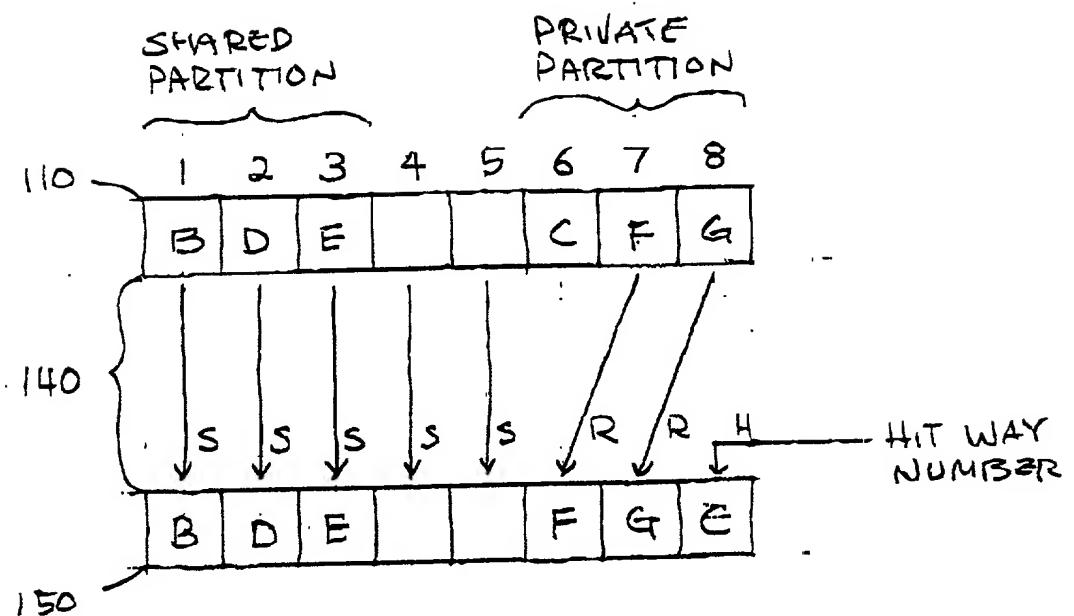


Figure 10
Hit on way C, which resides in private partition.

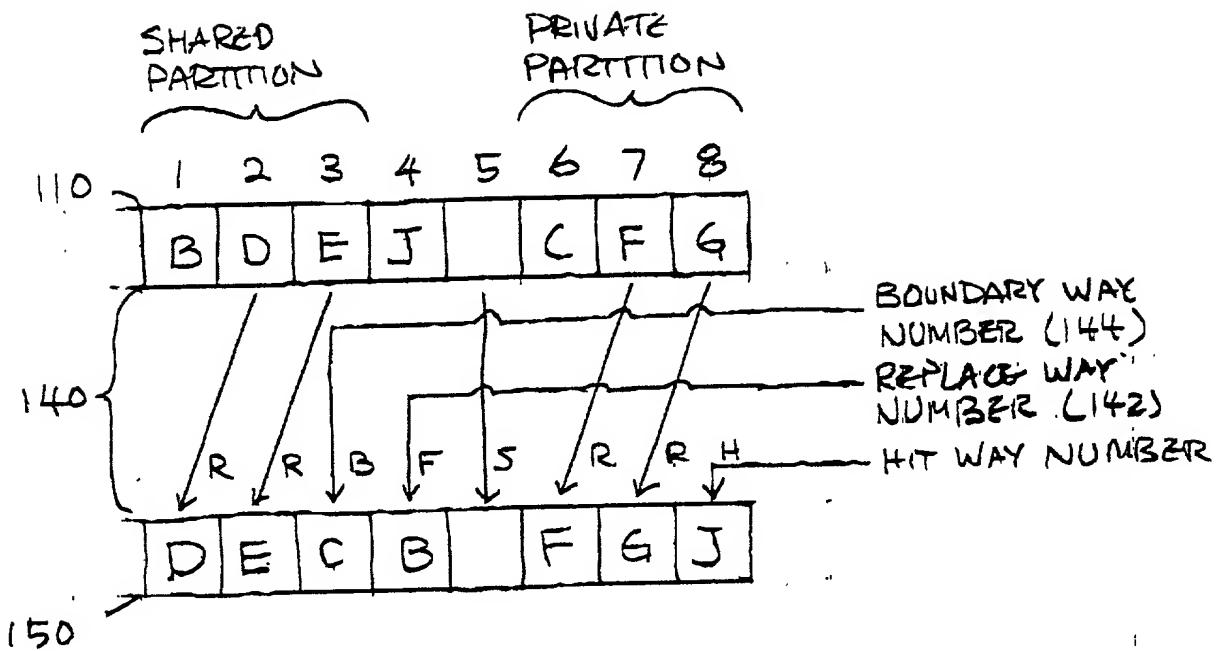


Figure 12

Hit on way S, which resides outside the shared and private partitions.

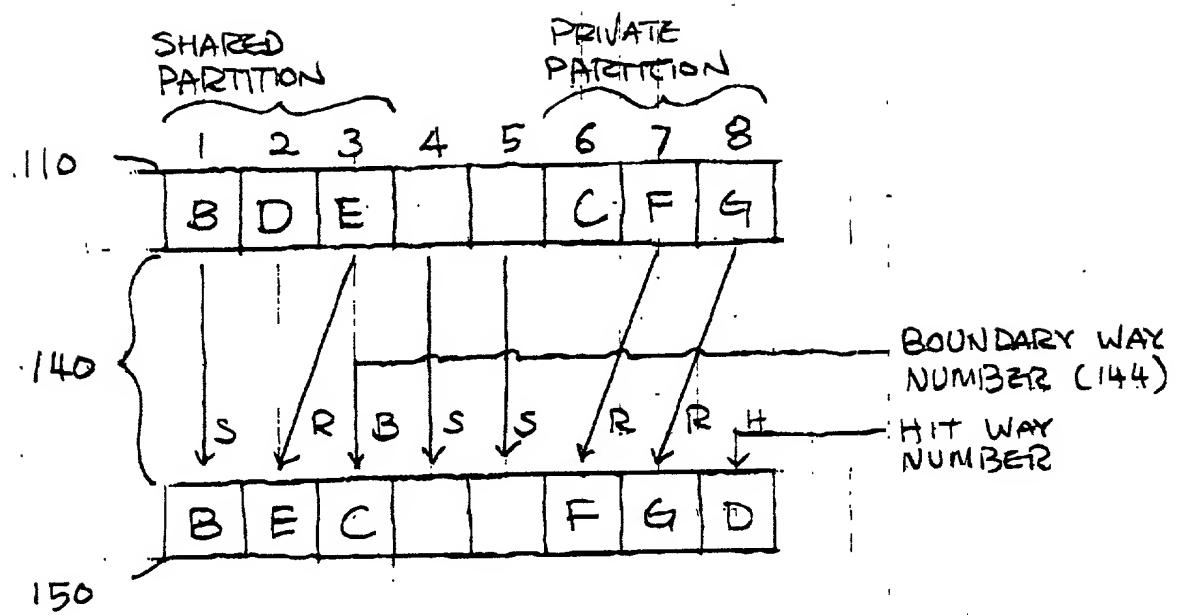


Figure 11.

Hit on way D, which resides in shared partition

ID	Access Result	mux 1	mux 2	mux 3	mux 4	mux 5	mux 6	mux 7	mux 8	Fsel	Bsel
W	miss	R	R	B	S	S	R	R	F	1	6
W	hit 1	R	R	B	S	S	R	R	H	1	6
W	hit 2	S	R	B	S	S	R	R	H	1	6
W	hit 3	S	S	B	S	S	R	R	H	1	6
W	hit 4	R	R	B	F	S	R	R	H	1	6
W	hit 5	R	R	B	S	F	R	R	H	1	6
W	hit 6	S	S	S	S	S	R	R	H	1	6
W	hit 7	S	S	S	S	S	S	R	H	1	6
W	hit 8	S	S	S	S	S	S	S	H/S	1	6

Table 3

FIGURE 12 A

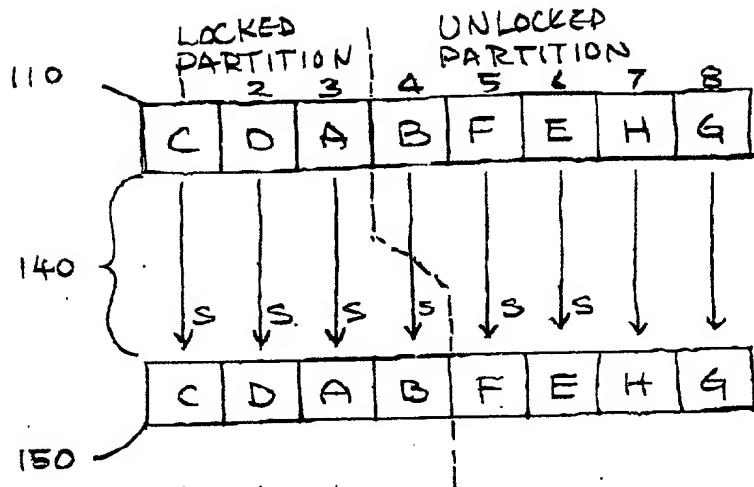


Figure 13.

Locking an element that is not in the caching device.

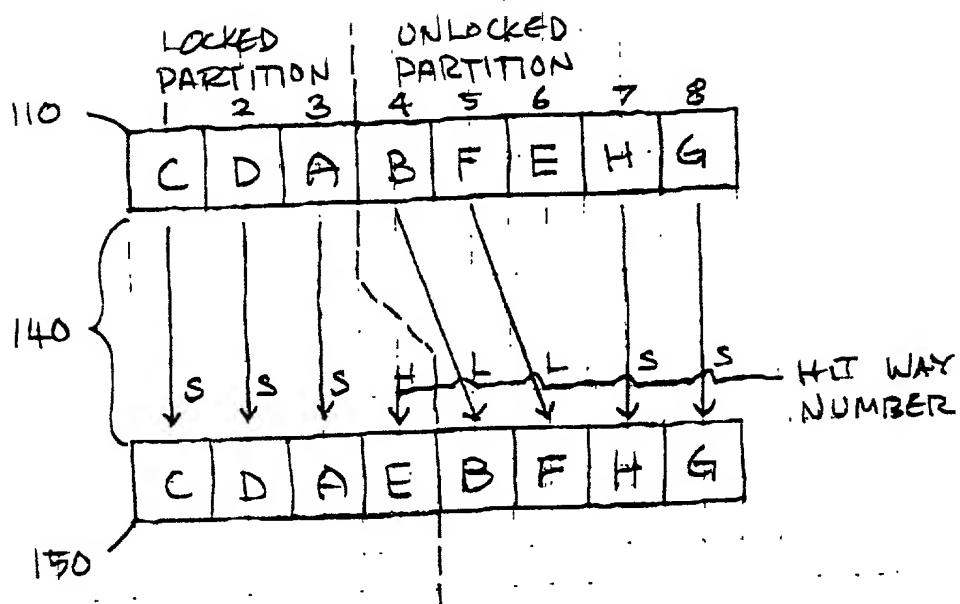


Figure 14.

Locking an element that is in caching device but is unlocked.

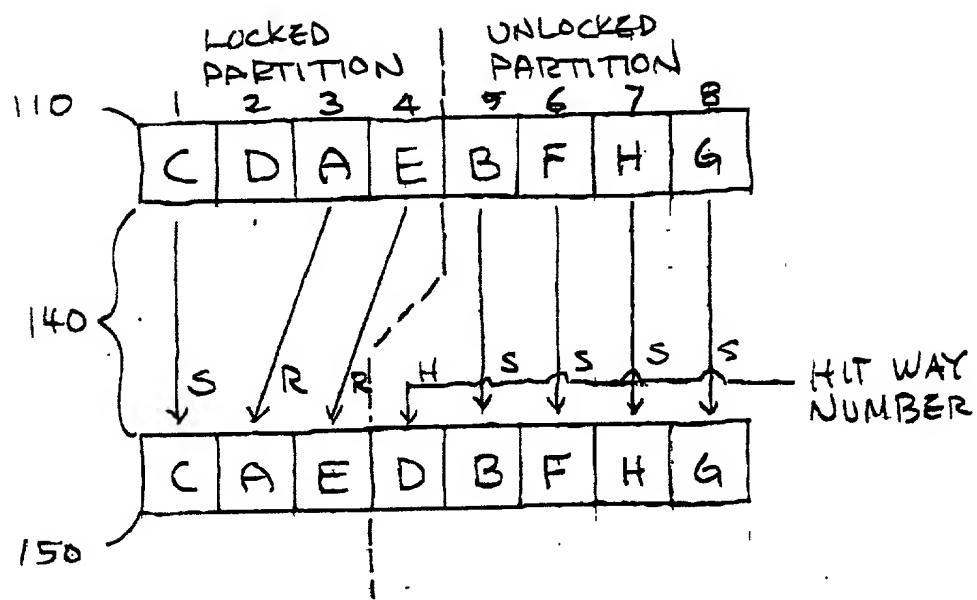


Figure 15

Unlocking an element that is in caching device .